A Simulated Hallucination Mechanism Compared to Hallucination Brain Response Studies

John J. McMurtrey, [a] Copyright 2007, May 3, 2007

Co-authorship is negotiable towards professional publication in an NLM indexed journal, Email- Johnmcmurt@aol.com
Donations toward future research are gratefully appreciated at http://www.slavery.org.uk/FutureResearch.htm

Abstract

The substantiation for a simulated hallucination mechanism is compared to brain response findings during hallucination in review. A technology for simulating auditory hallucination has had development that is based on the microwave hearing effect. The microwave hearing effect produces auditory responses consistent with many observations of brain activation occurring during hallucination. Some studies regarded as of hallucination indicate brain responses from the more initial auditory pathway that particularly support a microwave hearing mechanism. Further research is advocated for definitive differential diagnosis of simulated hallucination.

Introduction

[a] 903 N. Calvert St., Baltimore, MD 21202, email – Johnmcmurt@aol.com

Mechanisms of auditory hallucination are currently a mystery to medical understanding. Though hallucination is defined as a perception without a stimulus, there are technologies capable of remotely simulating hallucination. [1] One of these technologies is based on the fact that radio frequencies produce sound within absorbing materials when pulsed to sufficient peak power. [2] This phenomenon is usually termed microwave hearing, and is validated in review. [3] [4] [5] [6] [7] [8] There are considerable authentic references to the development of voice transmission based on the microwave hearing effect, which is also known as radio frequency hearing. Remote microwave voice transmission technology has long been discovered, [9] developed, [10] [11] [12] detailed in patents, [13] [14] [15] [16] and designated as a weapon [17] [18] with deleterious applications discussed. [19] [20] [21] Duplicated effort is usual to classified development, and successful demonstration of this voice transmission technology is indicated twice: first by magazine news report of manufactured device demonstration, [22] and stated by a later developer, [23] yet details remain classified. [24] That such technology can be applied remotely with coupling to target tracking technology and through wall radar capability Error: Reference source not found has implications for diagnosis, because complaint of 'hearing voices' features in a number of mental disorders. [25] [26] Microwave hearing reports are here reviewed along with studies of brain responses after hallucination for comparison of mechanisms, and observations consistent with simulated hallucination that indicate activation of the hearing pathway.

Anatomical features of the auditory pathway of interest to microwave hearing begin with the cochlea within which hair cells transduce sound into neural impulses that are transmitted through the vestibulocochlear nerve. The cochlear nerve arises from the vestibulocochlear nerve for transmission to the cochlear nuclear complex at the brainstem pontomedullary junction. [27] Neural fibers from the dorsal cochlear nucleus project [b] predominately [c] to the lateral lemniscus of the contralateral brainstem. [28] Axons from the ventral cochlear nucleus project through the trapezoid body to the ipsilateral and contralateral superior olivary complex. Error: Reference source not found This parallel route in the auditory pathway is mainly devoted to sound localization, and also joins the lateral lemniscus, which proceeds to the inferior colliculus. The above

[b] Through the commissure of Probst.

[c] This discussion describes the preponderant pattern of neural projection, as 90 % of the total brainstem auditory pathway is contralateral, yet there are ipsilateral projections as well according to Moore, 1985. Smaller projections from the dorsal cochlear nucleus to the superior olivary complex as well as synapses of less or undefined auditory nuclear origin to nuclei within main tracts of the lateral lemniscus and trapezoid body are also omitted here.

brainstem neural pathways contribute to the Auditory Brainstem Response recorded from surface electrodes. [29] The inferior colliculus connects brainstem auditory centers to the medial geniculate body in the posterior thalamus from which the rather disperse acoustic radiation projects to the primary auditory cortex. [30]

Microwave Hearing Studies

Actual sound response of the microwave hearing effect is recorded from implantable microphones known as hydrophones when placed within the heads of animals, [31] [32] as well as in model equivalents of muscle [33] and brain. [34] The physical effect is the basis for developing microwave-induced thermoacoustic tomography, which generates ultrasound frequencies within tissues, [35] [36] [37] and the hearing effect can be produced by appropriately pulsed Magnetic Resonance Imaging radio frequency coils. [38] The most accepted physical mechanism for microwave hearing is rapid thermoelastic expansion causing sound waves, Error: Reference source not found which activates the cochlea, but the middle ear is not involved. Error: Reference source not found

Microwaves pulsed for the hearing effect produce electrophysiologic response at various levels of the hearing pathway of animals including: the cochlear round window, [39] [40] [41] eighth cranial nerve, [d] [42] [43] cochlear nucleus, [44] [45] inferior colliculus, [46] medial geniculate body, [47] and auditory cortex. [48] Rat blood flow increases significantly in the temporal cortex, and the medial geniculate body with microwave hearing exposure. [49] Hearing effect pulsed microwave exposure increases rat brain glucose metabolism by [^{14}C] 2-deoxy-D-glucose with particular auditory pathway prominence in the cochlear nucleus, the superior olivary complex, the inferior colliculus, and medial geniculate body. [50] Microwave hearing exposure decreases animal cortical auditory evoked potential amplitudes with increased latency. [51] [52] The microwave hearing effect also produces an auditory brainstem response, [53] [54] which can be decreased by interfering sound. Error: Reference source not found

Studies of Brain Response on Hallucination

The functional imaging decrease in auditory cortex response to sound while hallucinations occur suggests shared brain pathways. [55] [56] Delayed auditory event response is observed during hallucination by both electroencephalography (EEG) and magnetoencephalography, [57] which resembles the interfering sound response. [58] Hallucination causes the auditory

[d] The eighth cranial nerve is the vestibulocochlear nerve.

electrophysiologic N100 to decrease in amplitude with delay of response, which implicates a shared pathway with sound. [59] Simultaneous auditory cortex activity occurs in each hemisphere during hallucination as demonstrated by EEG coherent response. [60] Auditory Brainstem Response (ABR) abnormalities of increased peak latency and missing peaks are especially associated with hallucinating schizophrenics [61] [62] without particular hearing impairment, and are frequent findings in some patients of studies not immediately assessing hallucination, [63] [64] [65] [66] [67] yet normal ABR reversion may occur on symptom improvement. [68]

Numerous functional imaging studies during hallucination confirm activation of the primary auditory cortex, [69] [70] [71] [72] [73] [74] [75] or the superior temporal gyrus (STG) [76] [77] [78] that contains the auditory cortex. Of further hallucination studies diverging somewhat in results, one reports posterior STG activity not including the auditory cortex, [79] and two found the STG not activated, [80] [81] yet no imaging technique is a snapshot of neural activity instantaneous to patient signaling of hallucination. [e] Subcortical functional imaging of the rest of the auditory pathway by commonly utilized methods is difficult. The acoustic radiation is somewhat disperse for functional observation, Error: Reference source not found and large blood vessel pulsation obscures resolution in the brainstem with this effect applying as well to the medial geniculate body, [82] which both have connection for the auditory pathway by the inferior colliculus. One study of hallucination noted activity in the region of the colliculi while stipulating problematic brain stem localization, Error: Reference source not found and another study detected activity within the inferior colliculus while ascribing detection to imaging without scanner noise. Error: Reference source not found

Discussion

Numerous investigations of the microwave hearing mechanism well demonstrate actual auditory activity, which fully predicts those brain response findings that hallucination resembles effects produced by sound. Many studies confirm primary auditory cortex activation on hallucination, and particularly the finding of increased activity in the vicinity of the colliculi, Error: Reference source not found or of the inferior colliculus Error: Reference source not found support a microwave hearing mechanism of simulated hallucination. Auditory Brainstem Response (ABR) abnormalities are especially apparent in

[e] There are methodological issues for capturing brain response, particularly to short hallucinatory episodes. In van de Ven et al. 2005, the estimation of time that a hallucination episode must last for adequate functional Magnetic Resonance Imaging capture of brain responses is 10 seconds, and some time constraint applies to the tomographic mechanics of Positron Emission Tomography as well.

hallucinating patients Error: Reference source not found Error: Reference source not found with some evidence that such abnormality does resolve, Error: Reference source not found which is predicted by direct microwave hearing auditory activation. Increased ABR wave latency found in 'hallucinating' patients are also reported for simple broadband noise coincident with the sound producing the ABR in normal subjects. [83] Other isolated ABR abnormalities of missing peaks in hallucinating patients correspond to forward masking effects of sound presented just prior to normal ABR testing. The solitary wave V of the ABR from one 'hallucinating' patient Error: Reference source not found matches the results on forward masking in normal subjects, where the additional sound precedes the ABR stimulus by milliseconds, and is of the same frequency. [84] The missing ABR wave I in another 'hallucinator' Error: Reference source not found can result from loudness and stimulus rate effects [85] as well as frequency quality

[1] McMurtrey J. Inner voice, target tracking, and Behavioral influence technologies. 2003 [Online] [Cited 2007 Apr 15] Available from URL: http://www.slavery.org.uk/InnerVoiceTargTrackBehavInflu.doc

[2] McMurtrey JJ. Recording microwave hearing effects: Literature review and case report of an affiant to recording remote harassment. 2005. [Online] [Cited 2007 Apr 15] Available from URL: http://www.slavery.org.uk/RecordingMicrowaveHearingEffects.doc

[3] Lin JC. Auditory perception of pulsed microwave radiation. In: Gandhi OP, editor. Biological effects and medical applications of electromagnetic energy. Englewood Cliffs, NJ: Prentice Hall, 1990; p 278-318.

[4] Chou C-K, Guy AW, Galambos R. Auditory perception of radio-frequency electromagnetic fields. J Acoust Soc Am 1982;71(6):1321-1334.

[5] Puranen L, Jokela K. Radiation hazards assessment of pulsed microwave radars. J Microwave Power Electromagn Energy 1996;31(3):165-177.

[6] Hermann DM, Hossmann K-A. Neurological effects of microwave exposure related to mobile communication. J Neurol Sci 1997;152:1-14.

[7] Lai H. Neurological effects of radiofrequency electromagnetic radiation. In: Lin JC, editor. Advances in electromagnetic fields in living systems. (vol 1) New York: Plenum Press, 1994; p 27-80.

[8] Elder JA, Chou CK. Auditory responses to pulsed radiofrequency energy. Bioelectromagnetics 2003;Suppl 8:S162-S173.

[9] Justesen DR. Microwaves and behavior. Am Psychologist 1975;392(Mar):391-401. Accessed 3/8/05 at Microwaves amd Behavior Excerpted reference at http://www.raven1.net/v2succes.htm

[10] Oskar KJ. Effects of low power microwaves on the local cerebral blood flow of conscious rats. Army Mobility Equipment Command Report # AD-A090426, 1980. Abstract accessible 4/8/05 at http://www.raven1.net/v2s-nasa.htm Available from NASA Technical Reports.

[11] Kohn B. Communicating via the microwave auditory effect. Defense Department Awarded SBIR Contract # F41624-95-C9007, 1993. In: Begich N. Controlling the human mind: The technology of political control or tools for peak performance. Anchorage, Alaska: Earthpulse Press, 2006; p 117. Contract abstract available from: URL: http://www.layinstitute.org/src/epidetails.asp?id=EPI277

[12] O'Loughlin J, Loree D. Theory and analysis of RF hearing, and invention disclosure of a method of encoding speech on an RF signal which intelligibly transmits that signal to the hearing receptors of a human. 1994 Nov 1. [Online] [Cited 2007 Mar 13] Available from URL: http://cryptome.org/rf-speech/rf-speech-04.pdf

of additional sound maskers [86] just prior to the ABR of normal subjects. Simulated hallucination at the time of ABR testing could explain all ABR abnormalities observed. [f] Therefore microwave hearing studies particularly correspond for observations during hallucination in temporal cortex, and some studies directly indicate activation of the initial portions of the sensory pathway that occurs in hearing by sound or microwaves.

The ABR is a common present clinical measurement, [87] which could be altered for patient signaling of 'hearing voices,' without sound presented or with such to replicate the 'hallucination'

---

[f] In Lindstrom et al, 1987, one patient with an abnormal ABR denied hallucination. Whatever the truth of this denial, there is certainly enough literature on patient non-compliance to acknowledge that Parkinsonian and extrapayramidal dyskinetic adverse effects particularly of typical anti-psychotics predominantly prescribed at the time of this study are obnoxious enough for some patients to deny such an obvious positive symptom for fear of increased dosage exacerbating these side effects.

[13] Brunkan WB. Patent # 4877027 Hearing system. USPTO granted 1989 Oct 31.

[14] Leyser R. Patent # DE10222439 Microwave hearing device uses modulated microwave pulses for providing induced sound warning directly within head of deaf person. Federal Republic of Germany Patent and Trademark Office published 2003 Dec 11. Abstract accessed 12/14/03 at http://v3.espacenet.com/textdoc?DB=EPODOC&IDX=DE10222439&F=0 Original German Document accessed 12/14/04 at http://v3.espacenet.com/pdfdocnav?DB=EPODOC&IDX=DE10222439&F=128&QPN=DE10222439 English translation available at http://www.sysos.co.uk/GermanV2K.doc Translation also available from the author, and Walter Madlinger at email - wmadliger@yahoo.de

[15] O'Loughlin JP, Loree DL. Patent # 6470214 Method and device for implementing the radio frequency hearing effect. USPTO granted 2002 Oct 22.

[16] O'Loughlin JP, Loree DL. Patent # 6587729 Apparatus for audibly communicating speech using the radio frequency hearing effect. USPTO granted 2003 July 1.

[17] Center for Army Lessons Learned Thesaurus at http://call.army.mil/products/thesaur_e/00016275.asp Apparently periodically terms are added to this Thesaurus and the url for this entry may change. If the link is broken Center for Army Lessons Learned has been available by Google search with the thesaurus on the home page, click thesaurus, and at the thesaurus index find voice to skull devices under V. Since the present article has been posted on the Internet, the entry has been programmed so that it cannot be printed. The Federation of American Scientists Project on Government Secrecy has made note of this in Aftergood S. "Voice to Skull: More Army Web Shenanigans" Secrecy News, vol 2004, issue 64, July 12, 2004, the last item at http://www.fas.org/sgp/news/secrecy/2004/07/071204.html (accessed 3/8/05). Secrecy News also provides a printable copy of the entry at http://www.fas.org/sgp/othergov/dod/vts.html (accessed 3/8/05).

[18] Disclosure and record of invention, AF form 1279 to document inventions for consideration of patenting by the Air Force. A method for encoding & transmitting speech by means of the radio frequency hearing phenomenon. 1994 Oct 27. [Online] [Cited 2007 Mar 13] Available from URL: http://cryptome.org/rf-speech/rf-speech-02.pdf

[19] Becker RO, Selden G. The body electric: Electromagnetism and the foundation of life. New York: Quill William Morrow, 1985; p 319-320.

[20] Department of the Army, USAF Scientific Advisory Board. New world vistas: air and space power for the 21st century. 1996;(Ancillary Volume), p 89-90. Quoted

associated abnormalities in previous studies. There are existing studies of normal ABR responses to speech sounds, [88] or different frequencies [89] with which any results might be compared. The functional Magnetic Resonance Imaging (fMRI) observation identifying inferior colliculus activity with 'hallucination' utilized ear plugs decreasing scanner noise effects, which obscures further hallucination induced activation in the auditory pathway. No other fMRI hallucination studies utilized the various scanner noise attenuation methods, and none utilized cardiac gating [g] [90] that are necessary to optimize observation of subcortical auditory pathway response in hearing studies for which protocols are available. [91] [92] Another clinical technique that may detect such occult cochlear activation is otoacoustic emission, [93] with expected differences between emissions that are spontaneous or evoked, [94] and differences in noise evoked emissions from transient evoked emissions described.

---

[g] Cardiac gating restricts the timing of imaging to only at a certain point in the cardiac cycle for minimization of blood vessel pulsation effects on image quality.

section available from: URL: http://mirror.electromagnet.us/vistas96.html
[21] "Surveillance Technology, 1976: policy and implications, an analysis and compendium of materials: a staff report of the subcommittee on constitutional rights of the committee of the judiciary. United States Senate, Ninety-fourth Congress, second session, p 1280, 1976. US GOV DOC Y 4.J 882:SU 7/6/976.
[22] Krawczyk G. CIA using old tricks again. Nexus Magazine, 1994 Oct/Nov;2(22):9.
[23] O'Loughlin J, letter to Ken Callahan, JA. 2001 Aug 30. [Online] [Cited 2007 Mar 13] Available from URL: http://cryptome.org/rf-speech/rf-speech-03.pdf
[24] Weinberger S. Mind games. Washington Post Sunday Magazine 2007 Jan 14; p 22-26 & 31-36. Available from URL; http://www.washingtonpost.com/wp-dyn/content/article/2007/01/10/AR2007011001399_pf.html . As well as by personal communication with the author.
[27] Warwick R, Williams PL, editors. Gray's anatomy. Norwich, UK: Jarrold and Sons, Ltd; 1973.
[28] West JB, editor. Best and Taylor's physiological basis of medical practice. Baltimore: Williams & Wilkins; 1985, 1003-21.
[31] Olsen RG, Lin JC. Microwave-induced pressure waves in mammalian brains. IEEE Trans Biomed Eng 1983;30(5):289-94.
[32] Lin JC, Su J-L, Wang Y. Microwave-induced thermoelastic pressure wave propagation in the cat brain. Bioelectromagnetics 1988;9:141-7.
[33] Olsen RG, Hammer WC. Microwave-induced pressure waves in a model of muscle tissue. Bioelectromagnetics 1980;1:45-54.
[34] Olsen RG, Hammer WC. Evidence for microwave-induced acoustical resonances in biological materials. J Microw Power 1981;16(3 & 4):263-9.
[35] Ku G, Wang LV. Scanning microwave-induced thermoacoustic tomography: Signal, resolution, and contrast. Medical Physics 2001;28(1):4-10.
[36] Ku G, Wang LV. Scanning thermoacoustic tomography in biological tissue. Medical Physics 2000;27(5):1195-1202.
[37] Xu Y, Wang LV. Signal processing in scanning thermoacoustic tomography in biological tissues. Medical Physics 2001;28(7):1519-24.
[38] Roschmann P. Human auditory system response to pulsed radiofrequency energy in RF coils for magnetic resonance at 2.4 to 170 MHz. Magn Reson Med 1991;21:197-215.
[39] Chou C-K, Guy AW, Galambos R. Characteristics of microwave-induced cochlear microphonics. Radio Science 1977;12(6S):221-227.

[95] Further definition of any subcortical hearing pathway involvement in hallucination must be undertaken, and any additional substantiation would strongly support technologic assault.

Only a few of the functional imaging studies of direct hallucination activity observe activation within Broca's area. Error: Reference source not found Error: Reference source not found Error: Reference source not found These few Broca's area activity reports have fostered the hypothesis that hallucination occurs by inner speech misattribution, [96] since the area is involved in producing inner speech without vocalization. [97] [98] However some Broca's area activity on

[40] Chou CK, Guy AW, Galambos R. Microwave-Induced Auditory Response: Cochlear Microphonics. In: Johnson CC, Shore ME, editors. Biological effects of electromagnetic waves, Vol. 1, HEW Publication (FDA) 77-8010, 1977, p 89-103.
[41] Chou C-K, Galambos R, Guy AW, Lovely RH. Cochlear microphonics generated by microwave pulses. J Microwave Power 1975;10(4):361-7.
[42] Lebovitz RM, Seaman RL. Single auditory unit responses to weak, pulsed microwave energy. Brain Res 1977;126:370-5.
[43] Lebovitz RM, Seaman RL. Microwave hearing: The response of single auditory neurons in the cat to pulsed microwave radiation. Radio Science 1977;12(6S):229-36.
[44] Seaman RL, Lebovitz RM. Auditory unit responses to single-pulse and twin-pulse microwave stimuli. Hear Res 1987;26:105-16.
[45] Seaman RL, Lebovitz RM. Thresholds of cat cochlear nucleus neurons to microwave pulses. Bioelectromagnetics 1989;10:147-60.
[46] Lin JC. Microwave auditory effects and applications. Springfield Ill: Thomas, 1978; p 78.
[47] Guy AW, Chou CK, Lin JC, Christensen D. Microwave-induced acoustic effects in mammalian auditory systems and physical materials. Ann NY Acad Sci 1975;247:194-218.
[48] Taylor EM, Ashleman BT. Analysis of central nervous system involvement in the microwave auditory effect. Brain Res 1974;74(2):201-8.
[49] Oscar KJ, Gruenau SP, Folker MT, Rapoport SI. Local cerebral blood flow after microwave exposure. Brain Res 1981;204:220-25.
[50] Wilson BS, Zook, JM, Joines WT, Casseday JH. Alterations in activity at auditory nuclei of the rat induced by exposure to microwave radiation: Autoradiographic Evidence Using [14 –C]2Deoxy-D-Glucose. Brain Res 1980;187:291-306.
[51] Sagalovich BM, Melkumova GG. [Research on the action of superhigh-frequency electromagnetic waves on evoked potentials of auditory centers in connection with prospects for using inadequate auditory stimulation.] Vestnick Otorinolaring. 1974;4:3-8. (An English translation is available in Popov, SL (ed.) Effects of Non-Ionizing Electromagnetic Radiation. JPRS report # 64532, Arlington, VA, 1975, p. 23-30.)
[52] Guy AW, Lin JC, Harris FA. The effect of microwave radiation on evoked tactile and auditory CNS responses in cats. 7th annual microwave power symposium (abstracts), New York: International Microwave Power Institute, 1972; p 21. Abstract accessed 1/12/05 from Inspec.
[53] Frey AH. Brain stem evoked responses associated with low-intensity pulsed UHF energy. J Appl Physiol 1967;23(6):984-8.
[54] Lin JC, Meltzer RJ, Redding FK. Microwave-evoked brainstem potentials in cats. J Microw Power 1979;14(3):291-6.
[55] Woodruff PWR, Wright IC, Bullmore ET, Brammer M, Howard RJ, Williams SCR, et al. Auditory hallucination and the temporal cortical response to speech in schizophrenia: A functional magnetic resonance imaging study. Am J Psych

hearing words, [99] [100] for statements, [101] [102] and with activity increases for subjectively significant, [103] or emotional words [104] particularly those unpleasantly arousing, [105] mitigates considerably Broca's area activity *per se* as evidence of involvement in producing hallucination, since hallucination frequently involves all conditions. [106] Furthermore, Broca's area during hallucinations does not correspond for EEG coherent activity between the hemispheres, but electrodes over each auditory cortex exhibit coherent response. Error: Reference source not found

---

1997;154:1676-82.

[56] David AS, Woodruff PWR, Howard R, Mellers JDC, Brammer M, Bullmore E, et al. Auditory hallucinations inhibit exogenous activation of auditory cortex. Neuroreport 1996;7(4):932-6.

[57] Tiihonen J, Hari R, Naukkarinen H, Rimon R, Jousmaki V, Kajola M. Modified activity of the human auditory cortex during auditory hallucinations. Am J Psychiatry 1992;149(2):255-7.

[58] Hari R, Makela JP. Modification of neuromagnetic responses of the human auditory cortex by masking sounds. Exp Brain Res 1988;71:87-92.

[69] Matsuda H, Gyobu T, Ii M, Hisada K. Increased accumulation of N-isopropyl-(I-123) p- iodoamphetamine in the left auditory area in a schizophrenic patient with auditory hallucinations. Clin Nucl Med 1988;13(1):53-5.

[70] Matsuda H, Gyobu T, Ii M, Hisada K. Iodine-123 iodamphetamine brain scan in a patient with auditory hallucinations. J Nucl Med 1988;29(4):558-60.

[71] Bentaleb LA, Beauregard M, Liddle P, Stip E. Cerebral activity associated with auditory verbal hallucinations: a functional magnetic resonance imaging case study. J Psychiatry Neurosci 2002;27(2):110-15.

[72] Lennox BR, Park SBG, Medley I, Morris PG, Jones PB. The functional anatomy of auditory hallucinations in schizophrenia. Psychiatry Res Neuroimag Sec 2000;100:13-20.

[73] van de Ven VG, Formisano E, Roder CH, Prvulovic D, Bittner RA, Dietz MG, et al. The spatiotemporal pattern of auditory cortical responses during verbal hallucinations. Neuroimage 2005;27:644-55.

[74] Shergill SS, Brammer MJ, Williams SCR, Murray RM, McGuire PK. Mapping auditory hallucinations in schizophrenia using functional magnetic resonance imaging. Arch Gen Psychiatry 2000;57:1033-7.

[75] Dierks T, Linden DEJ, Jandl M, Formisano E, Goebel R, Lanfermann H, et al. Activation of Herschl's gyrus during auditory hallucinations. Neuron 1999;22:615-21.

[76] Suzuki M, Yuasa S, Minabe Y, Murata M, Kurachi M. Left superior temoral blood flow increases in schizophrenic and schizophreniform patients with auditory hallucination: A longitudinal case study using ^{123}-IMP SPECT. Psychiatry Clin Neurosci 1993;242:257-61.

[77] Shergill SS, Cameron LA, Brammer MJ, Williams SCR, Murray RM, McGuire PK. Modality specific neural correlates of auditory and somatic hallucinations. J Neurol Neurosurg Psychiatry 2001;71:688-90.

[78] Erkwoh R, Ebel H, Kachel F, Reiche W, Ringelstein EB, Bull U, et al. ^{18}FDG-PET and electroencephalographic findings in a patient suffering from musical hallucinations. Nucl Med 1993;32:159-63.

[79] Copolov DL, Seal ML, Maruff P, Ulusoy R, Wong MTH, Tochon-Danguy HJ, et al. Cortical activation associated with the experience of auditory hallucinations and perception of human speech in schizophrenia: A PET correlation study. Psychiatr Res NeuroImag 2003;122:139-52.

Brodman's Areas (BA) 41 and 42 comprise the primary auditory cortex. These areas during inner speech are reported as actually deactivated in BA 41, Error: Reference source not found without observed activation in normals Error: Reference source not found [107] [108] [109] or schizophrenics, [110] [111] and only show some partial activation during very fast repetition (in BA 42), which is lesser in schizophrenics. [112] Therefore the endogenous hallucination hypothesis with any empirical evidence does not well correlate with the majority of inner speech observations.

---

[80] McGuire PK, Shah GMS, Murray RM. Increased blood flow in Broca's area during auditory hallucinations in schizophrenia. Lancet 1993;342:703-6.
[81] Silbersweig DA, Stern E, Frith C, Cahill C, Holmes A, Grootoonk S, et al. A functional neuroanatomy of hallucinations in schizophrenia. Nature 1995;378:176-9.
[87] Nuwer MR. Fundamentals of evoked potentials and common clinical applications today. Electroencephal Clin Neurophysiol 1998;106:106-48.
[25] American Psychiatric Association DSM-IV Task Force. Diagnostic and statistical manual of mental disorders, fourth edition (DSM-IV-TR™) Washington D. C.: American Psychiatric Association, 2000; p 297-343.
[26] Flaum M, Schultz SK. The core symptoms of schizophrenia. Ann Med 1996;28(6):525-31.
[29] Moore JK. The human auditory brain stem as a generator of auditory evoked potentials. Hear Res 1987;29:33-43.
[30] Rademacher J, Burgel U, Zilles K. "Stereotaxic localization, intersubject variability, and interhemispheric differences of the human auditory thalamocortical system. Neuroimage 2002;17(1):142-60.
[59] Hubl DA, Koenig T, Strik WK, Garcia LM, Dierks T. Competition for neuronal resources: how hallucinations make themselves heard. Br J Psychiatry 2007;190:57-62.
[60] Sritharan A, Line P, Sergejew A, Silberstein R, Egan G, Copolov D. EEG coherence measures during auditory hallucinations in schizophrenia. Psychiatry Res 2005;136:189-200.
[61] Lindstrom L, Klockhoff I, Svedberg A, Bergstrom K. Abnormal auditory brain-stem responses in hallucinating schizophrenic patients. Br J Psychiat 1987;151:9-14.
[62] Nam E-C. Is it necessary to differentiate tinnitus from auditory hallucination in schizophrenic patients? J Laryngol Otol 2005;119:352-5.
[63] Igata M, Ohta M, Hayashida Y, Abe K. Missing peaks in auditory brainstem responses and negative symptoms in schizophrenia. Jpn J Psychiatry 1994;48(3):571-8.
[64] Harell M, Englender M, Kimhi R, Demer M, Zohar M. Auditory brain stem responses in schizophrenia patients. Laryngoscope 1986;96:908-10.
[65] Lindstrom LH, Wieselgren I-M, Klockhoff I, Svedberg A. Relationship between abnormal brainstem auditory-evoked potentials and subnormal CSF levels of HVA and 5-HIAA in first episode schizophrenic patients. Biol Psychiatry 1990;28:435-42.
[66] Kimhi R, Englender M, Zohar M, Harell M. Brainstem auditory evoked responses in hospitalized schizophrenic patients. Isr J Psychiatry Relat Sci 1987;24(4):289-94.
[67] Hayashida Y, Mitami Y, Hosomi H, Amemiya M, Mifune K, Tomita S. Auditory brain stem responses in relation to the clinical symptoms of schizophrenia. Biol Psychiatry 1986;21:177-88.
[68] Igata M, Ohta M, Hayashida Y, Abe K. Normalization of auditory brainstem responses resulting from improved clinical symptoms in schizophrenia. Schizophrenia Res 1995;16:81-2.

Besides the issue of primary auditory cortex activation, subcortical hearing pathway activation while 'hearing voices' is particularly inconsistent with the inner speech model. Though the inner speech model of hallucination is entirely logical, and endogenous hallucination does apparently exist, the discrepancies point out the fact that in terms of a known pathway this model is entirely theoretical, especially as compared to the defined auditory pathway that is the mechanism of microwave hearing. Many patients attempt effective complaint of remote voice transmission, but are neutralized with their civil rights abrogated by shunting into the medical community who deem stigmatizing diagnoses based on uninformed dogma. There are considerable rationale to suspect schizophrenia diagnoses, particularly of the paranoid type as presumptive. [113] Considering that some evidence implicates subcortical auditory activation in 'hallucination,' both ethics and the scientific method make investigation of a microwave hearing mechanism imperative. Defining initial auditory pathway activation consistent with sound is fully expected as a differential criterion in diagnosing simulated hallucination.

---

[85] Burkhard RF, Sims D. The human auditory brainstem response to high click rates: Aging effects. Am J Audiol 2001;10:53-61.
[88] Wible B, Nicol T, Kraus N. Atypical brainstem representation of onset and formant structure of speech sounds in children with language-based learning problems. Biol Psychol 2004;67:299-317.
[89] Frattali MA, Sataloff RT, Hirshout D, Sokolow C, Hills J, Spiegel JR. Audiogram construction using frequency specific auditory brainstem response (ABR) thresholds. Ear Nose Throat J 1995;74(10):691-4.
[90] Di Salle F, Esposito F, Scarbino T, Formisano E, Marciano E, Saulino C, et al. fMRI of the auditory system: understanding the neural basis of auditory gestalt. Mag Reson Imag 2003;21:1213-24.
[91] Yatkin FZ, Roland PS, Mendelsohn DB, Purdy PD. Functional magnetic resonance imaging of activation in subcortical auditory pathway. Larynogscope 2004;114:96-101.
[92] Harms MP, Melcher R. Sound repetition in the human auditory pathway: Representations in the waveshape and amplitude of fMRI activation. J Neurophysiol 2002;88(3):1433-50.
[93] Kemp DT. Otoacoustic emissions, their origin in cochlear function, and use. Br Med Bull 2002;63:223-41.
[94] Shera CA, Guinan JJ. Evoked otoacoustic emissions arise by two fundamentally different mechanisms: A taxonomy for mammalian OAEs. J Acoust Soc Am 1999;105(2, pt 1):782-98.
[95] Harte JM, Elliott SJ. Using the short-time correlation coefficient to compare transient- and derived, noise-evoked otoacoustic emission temporal waveforms. J Acoust Soc Am 2005;117(5):2989-98.
[96] Jones SR, Femyhough C. Neural correlates of inner speech and auditory verbal hallucinations: A critical review and theoretical integration. Clin Psychol Rev 2007;27:140-54.
[97] Shergill SS, Bullmore ET, Brammer MJ, Williams SCR, Murray RM, McGuire PK. A functional study of auditory verbal imagery. Psychol Med 2001;31:241-53.
[98] Huang J, Carr TH, Cao Y. Comparing cortical activations for silent and overt speech using event related fMRI. Hum Brain Mapp 2001;15:39-53.

Acknowledgements: Thanks are given to God for inspiration and Dr. Allen Barker for his suggestions.

References

[103] Ofek E, Pratt H. Neurophysiological correlates of subjective significance. Clin Neurophysiol 2005;116:2354-62.
[104] Beauregard M, Chertkow H, Bub D, Murtha S, Dixon R, Evans A. The neural substrate for concrete, abstract, and emotional word lexica: A positron emission tomography study. J Cogn Neurosci 1997;9(4):441-61.
[105] Maddock RJ, Garrett AS, Buonocore MH. Posterior cingulate activation by emotional words: fMRI evidence from a valence decision task. Hum Brain Mapp 2003;18:30-41.
[106] Nayani TH, David AS. The auditory hallucination: a phenomenonological survey. Neuroimage 1996;26:177-89.
[109] Menard MT, Kosslyn SM, Thompson WL, Alpert NM, Rauch SL. Encoding words and pictures: A positron emission tomography study. Neuropsychol 1996;34(3):185-94.
[110] Shergill SS, Bullmore E, Simmons A, Murray R, McGuire P. Functional anatomy of auditory verbal imagery in schizophrenic patients with auditory hallucinations. Am J Psychiatry 2000;157:1691-3.
[111] McGuire PK, Silbersweig DA, Wright I, Murray RM, David AS, Frackowiak RSJ, et al. Abnormal monitoring of inner speech: a physiological basis for auditory hallucinations. Lancet 1995;346:596-600.
[112] Shergill SS, Brammer MJ, Fukuda R, Williams SCR, Murray RM, McGuire PK. Engagement of brain areas implicated in processing inner speech in people with auditory hallucinations. Br J Psychiatry 2003;182:525-31.
[82] Devlin JT, Sillery EL, Hall DA, Hobden P, Behrens TE, Nunes RG, et al. Reliable identification of the auditory thalamus using multi-model structural analyses. Neuroimage 2006;30(4):1112-20.
[83] Burkard R, Hecox KE. The effect of broadband noises on the human brain-stem auditory evoked response. III. Anaromic locus. J Acoust Soc Am 1987;81(4):1050-63
[84] Walton J, Orlando M, Burkard R. Auditory brainstem response forward-masking recovery functions in older humans with normal hearing. Hear Res 1999;127:86-94
[86] Klein AJ. Masking effects on ABR waves 1 and V in infants and adults. J Acoust Soc Am 1986;79(3):755-9.
[99] Price CJ, Wise RJ, Warburton EA, Moore CJ, Howard D, Patterson K, et al. Hearing and saying. The functional neuro-anatomy or auditory word processing. Brain 1996;119(Pt 3):919-31.
[100] Mellet E, Tzourio N, Denis M, Mazoyer B. Cortical anatomy of mental imagery of concrete nouns based on their dictionary definition. Neuroreport 1998;9(5):803-8.
[101] Caplan D, Alpert N, Waters G. PET studies of syntactic processing with auditory sentence presentation. Neuroimage 1999;9:343-51.
[102] Michael EB, Keller TA, Carpenter PA, Just MA. fMRI investigation of sentence comprehension by eye and by ear: Modality fingerprints on cognitive processes. Hum Brain Mapp 2001;13:239-52.
[107] Perani D, Cappa SF, Schnur T, Tettamanti M, Collins S, Rosa MM, et al. The neural correlates of verb and noun processing. A PET study. Brain

1999;122(12):2337-44.
[108] Bookheimer SY, Zeffiro TA, Blaxton T, Gaillard W, Theodore W. Regional cerebral blood flow during object naming and word reading. Hum Brain Mapp 1995;3:93-106.
[113] McMurtrey JJ: Microwave bioeffect congruence with schizophrenia. 2002 [Online] [cited 2007 Apr 15] Available from:
URL:http://www.slavery.org.uk/MicrowaveCongruenceSchiz.doc